

RELATION OF WINDS TO TEMPERATURE IN CENTRAL OHIO.

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[U. S. Weather Bureau, Columbus, Ohio, Mar. 22, 1920.]

SYNOPSIS.

This paper presents by table and graph the existing relation between the direction of the wind and the existing or current temperature, as well as the subsequent 24-hour temperature change. The data are taken from the records of the Columbus (Ohio) office, 1909-1918, inclusive.

It is a fact of common knowledge that some winds are warmer than others, yet it is not generally known that from certain directions, in central Ohio, winds are cooler during the entire year than from others. A glance at figure 1 will reveal this difference, for during all seasons winds from the north and the northwest are accompanied

north in the summer and autumn. During the winter the higher temperatures accompany the southeast wind, changing to the south in spring, to the southwest in summer, and back to the south in the autumn.

There also exists a relation between the direction of the surface wind and the subsequent 24-hour temperature change. That is to say, certain winds may be considered as fair prognostics of colder weather or of warmer weather. Thus, considering figure 2, it will be seen that during the spring months, the southeast, east, northeast, and north directions are followed by warmer weather, the north-

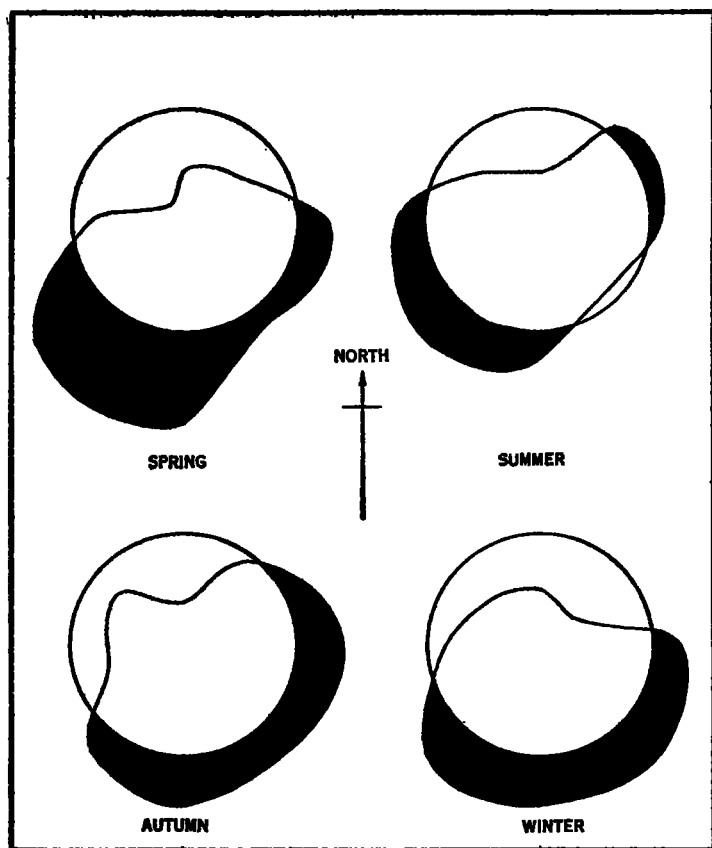


FIG. 1.—Showing the relation between the prevailing direction of wind at 7 a. m. and 7 p. m. and current temperature, Columbus, Ohio, 1909-1918, inclusive. Warm winds represented by that portion in solid black outside of circle; cold winds by that portion inside. (Scale: 1 inch radially equals 20° F.)

by lower temperatures than from any of the other directions, and also it is evident that winds from the south are warmer than from other directions. The southeast wind may be classified as a warm wind during most of the year, but is cooler than the average of all directions during the summer months. The east wind, too, is much cooler in the summer months, relatively speaking, than during the autumn and winter months.

Table 1 shows the average temperature at the semi-daily observation hours, arranged according to the direction of the surface wind at that time. Thus it will be seen again that the north wind for the year is cooler and the south wind warmer than the average. It is to be noted, however, that during the winter months central Ohio experiences the coldest weather with the northeast wind, changing to the northwest in the spring, and to the

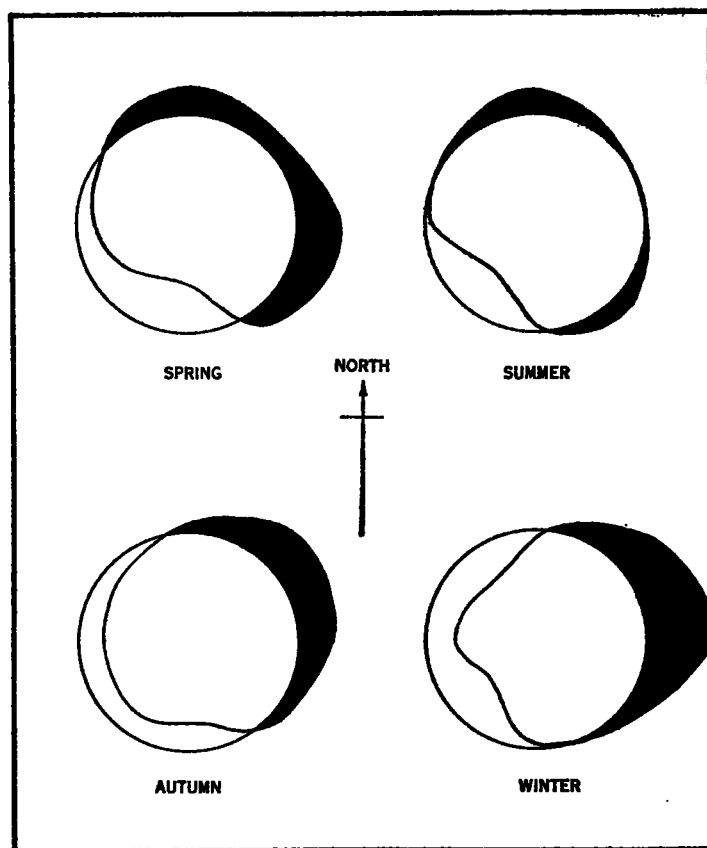


FIG. 2.—Showing the relation between the prevailing direction of wind at 7 a. m. and 7 p. m. and subsequent 24-hour temperature changes, Columbus, Ohio, 1909-1918, inclusive. Positive changes represented by that portion of wind rose outside of circle; negative changes by that portion on inside. (Scale: 1 inch radially equals 20° F.)

west being practically neutral or without prognostic value, while all other directions presage cooler conditions. During the summer the east wind loses its prognostic value. During the autumn the northwest wind becomes a harbinger of cooler weather, while the east wind again precedes warmer atmosphere. In the winter, it is to be noted, any easterly direction from south to north may be considered as of fair prognostic value indicating increasing temperatures, while all westerly directions indicate lower temperatures.

Table 2 merits careful consideration. It shows the number of times temperature changes, positive and negative, have occurred during the ten years, 1909-1918, inclusive, during the 24 hours following the observation of a given direction of surface wind. Of course, in no case is the prognostic value sufficiently high to warrant implicit

confidence in the wind directions as temperature indicators, but the figures show that there does exist a relation. Especially important is the fact disclosed in Table 2 that of the 32 winter temperature falls equaling or exceeding 30° during the 10-year period in question, 21 occurred following the west and southwest winds. Cold waves during winter months with temperature falls exceeding 20° occurred 123 times, and 85 of these occasions followed a westerly wind. It is also noteworthy that during the winter months 26 of the 123 temperature falls equaling or exceeding 20° followed the southeast wind, normally an indication of higher temperature. This fact was brought about by the passage of rapidly moving Lows, far in excess of normal speed, and the temperature rise as well as the subsequent cold wave occurred within the 24-hour period.

Under ordinary conditions, at Columbus, Ohio, it seems safe to consider the north, northeast, east, and southeast winds as prognostics of warmer weather 24 hours later, except in summer, when the east wind has no prognostic value; and the northwest, west, southwest, and south winds as prognostics of cooler conditions 24 hours later, except in summer, when the northwest wind is usually followed by higher temperatures. However, excepting the case of the east wind in winter, the true prognostic values are low and do not justify much reliance. Their value would be appreciable only when used in conjunction with other indications.

TABLE 1.—Showing the relation of the 7 a. m. and 7 p. m. direction of wind to the actual air temperature at those hours, and to the average subsequent 24-hour temperature changes, based on the records at Columbus, Ohio, 1909-1918, inclusive.

TO CURRENT TEMPERATURE.

Direction.	Spring.	Summer.	Autumn.	Winter.	Annual.
	° F.	° F.	° F.	° F.	° F.
North.....	44.5	63.8	46.6	23.0	44.6
Northeast.....	46.4	70.4	52.6	21.8	47.8
East.....	53.1	70.6	56.8	30.6	52.8
Southeast.....	52.2	63.6	56.2	32.8	52.5
South.....	58.7	72.5	57.7	32.5	56.4
Southwest.....	57.6	74.7	55.7	31.6	54.9
West.....	48.4	72.1	49.5	26.1	49.0
Northwest.....	41.4	66.3	47.9	23.3	44.8
Mean, seasonal.....	50.3	66.8	52.8	28.0	50.2

TO SUBSEQUENT 24-HOUR TEMPERATURE CHANGES.

North.....	+3.3	+2.2	+1.3	-0.7	+1.9
Northeast.....	+2.4	+0.4	+4.1	+5.3	+3.1
East.....	+4.4	+0.1	+3.4	+7.9	+3.9
Southeast.....	+2.6	+1.6	+1.7	+2.0	+2.0
South.....	-4.0	-0.5	-2.4	+1.1	-1.5
Southwest.....	-2.6	-4.4	-1.6	-3.4	-3.0
West.....	-2.0	-0.5	-1.8	-1.6	-1.5
Northwest.....	+1.5	+0.3	-1.1	-2.0	-0.3
Seasonal mean.....	+0.7	0	-0.4	+1.2	+0.6

TABLE 2.—Showing the number of times various wind directions were followed by positive or negative temperature changes, arranged according to the seasons, Columbus, Ohio, period 1909-1918, inclusive.

Direction.	Number times noted.	6 degrees or more.		8 degrees or more.		10 degrees or more.		15 degrees or more.		20 degrees or more.		30 degrees or more.	
		+	-	+	-	+	-	+	-	+	-	+	-
SPRING.													
North.....	235	61	15	52	9	40	2	14	0	1	0	0	0
Northeast.....	131	34	13	18	8	12	2	4	0	0	0	0	0
East.....	159	62	7	33	2	20	0	18	0	3	0	0	0
Southeast.....	253	131	62	108	48	80	44	36	30	7	7	1	1
South.....	226	41	97	30	81	19	76	13	39	4	10	0	2
Southwest.....	214	32	84	27	60	18	54	11	28	6	18	0	2
West.....	214	30	68	28	47	10	25	3	14	0	4	0	1
Northwest.....	317	78	63	62	40	53	28	20	15	3	4	0	1
SUMMER.													
North.....	235	62	28	30	13	17	6	7	1	1	0	0	0
Northeast.....	199	13	17	5	11	1	3	0	1	0	0	0	0
East.....	194	20	28	12	23	4	14	0	2	0	1	0	0
Southeast.....	229	29	17	14	10	6	4	3	1	0	0	0	0
South.....	320	25	53	19	43	11	17	6	8	1	1	0	0
Southwest.....	280	17	87	12	59	8	27	2	15	0	5	0	0
West.....	150	37	27	18	24	10	13	2	7	0	1	0	0
Northwest.....	213	20	29	13	18	6	9	2	2	0	0	0	0
AUTUMN.													
North.....	174	41	47	21	31	12	26	4	8	0	3	0	0
Northeast.....	129	46	21	26	12	19	8	11	5	3	1	2	0
East.....	200	90	21	72	7	51	5	32	1	17	0	8	0
Southeast.....	301	75	38	58	35	37	30	18	23	7	11	0	0
South.....	287	40	88	35	74	25	66	17	41	3	25	1	9
Southwest.....	245	38	68	28	59	23	42	13	31	2	18	0	5
West.....	241	24	97	21	74	17	53	7	34	3	16	0	3
Northwest.....	238	23	31	17	25	11	17	7	13	1	7	0	2
WINTER.													
North.....	156	31	44	26	28	22	13	15	7	6	3	1	0
Northeast.....	78	31	24	28	14	22	10	13	4	6	1	1	0
East.....	123	65	20	55	15	47	10	33	3	19	0	2	0
Southeast.....	275	142	72	126	57	105	48	58	36	31	26	6	3
South.....	272	108	104	82	62	63	50	29	26	14	8	1	4
Southwest.....	280	90	104	76	97	67	68	35	65	14	32	3	11
West.....	318	88	129	72	96	62	74	26	46	8	35	0	10
Northwest.....	289	37	85	26	74	16	62	6	33	0	18	0	4

THE VALUE OF HIGH-LEVEL METEOROLOGICAL DATA IN FORECASTING CHANGES OF TEMPERATURE—A CONTRIBUTION TO THE METEOROLOGY OF MOUNT ROSE, NEV.¹

By S. P. FERGUSON.

[Author's summary.]

The general relation or connection between the conditions recorded at the summit and base stations of Mount Rose appears to be practically the same as that found to exist between the summit and base stations of mountains in other parts of the world.

Of the decided falls of temperature or cold waves occurring on the summit during four years of observa-

¹ Reprinted from Technical Bulletin No. 83, University of Nevada Agricultural Experiment Station, Reno, Nev., 1915, pp. 29 and 30.